

## Measurement of multidimensional child poverty in Morocco 2001-2014 Methodology and Results

Abdeljaouad EZZRARI & Khalid SOUDI<sup>1</sup>

### Abstract

The objectives of this study are: (i) proposing a multidimensional measure of poverty approach to quantify the extent of this phenomenon; (ii) determining the dimensions and factors that contribute to its social reproduction; and (iii) determining the Child Poverty profile. Among other things, this mainly aims to respond to the following questions: Who are these poor children? Why are they poor? What are the correlates and reproductive factors in child poverty? Is there a generational transmission of poverty? What are the individual, family and community determinants of child poverty? How has this poverty evolved?

The methodological approach developed as part of this investigation was based on the theory of fuzzy sets and on MPI Alkire and Foster approach. By combining these two approaches, the final approach is :

- 1) determining the weights of the dimensions defining the space of the well-being of children;
- 2) standardizing dimensional indices defining the well-being of children;
- 3) calculating the composite index of deprivation according to the approach of fuzzy sets;
- 4) and calculating of the indices of multidimensional poverty according Alkire and Foster approach.

The results of this study show a general improvement of social children welfare. The evolution of the composite index of deprivation highlights the continuing decline of the situation of children deprivation, of all ages: it dropped by nearly half, from 0.295 in 2001 to 0.128 in 2014. Along with this trend, multidimensional child poverty knew a strong downward trend. The prevalence of poor children evolved from 43.6% in 2001 to 24.1% in 2007 and 11.0% in 2014. From the outset, the share of severely poor children moved from 24.5% in 2001 to 9.7% in 2007 and 2.6% in 2014. It is in rural areas where this form of poverty is most striking: in 2014, it was 5.4%, while 0.3% in urban areas. These indices were respectively 45.1% and 3.3% in 2001.

Poverty experienced in childhood is a social reproduction of adult poverty and a consequence of poor living conditions. The risk of multidimensional child poverty is strongly differentiated by socio-professional category of the head of household. Similarly, education and knowledge are also proving essential determinants in improving children's standard of living.

**Keyword: Measurement, Multidimensional, Childhood, Poverty, socio-professional , Alkire and Foster approach, Morocco .**

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<sup>1</sup> Researchers, specialists in living standards measurement studies, at the Observatory of population's living conditions in High Commission for Planning in Morocco.

Khalid Soudi is the director of the Observatory & Abdeljaouad Ezzrari is the head of monitoring and assessment of living conditions.

## Introduction

Improving the understanding of the Moroccan children's situation of the well-being, and the inherent issues and challenges, is a statistical framework necessary to any actions aimed at breaking the cycle of intergenerational transmission of vulnerability and poverty, strengthening the pro-poor quality of public policies, reducing the inequality of opportunities faced by children, and supporting poor households to raise up their children. To do this, this study is framed around the following:

- (i) methodological and analytical framework of multidimensional child poverty: this axis presents the approach developed in this study to measure the multidimensional child poverty;
- (ii) Comparative Profile welfare and multidimensional child poverty.

### **Methodological Framework: proposing of a measurement approach to multidimensional child poverty**

Attempts to conceptualize child poverty are many and lead to a series of deprivation that prevent this segment of the population to enjoy their rights. Basically, different definitions opt for three well-being dimensions to define child poverty,: (i) lack of survival means: in other terms, growing up without access to financial and nutritional resources necessary for survival and development; (ii) family and community structures' failure to protect children (social resources); and (iii) lack of opportunities to participate in political life (political resources).

### **Measurement methodology of multidimensional child poverty: combined approach of fuzzy sets and Alkire-Foster**

The measurement of multidimensional poverty of children is based on the combination of fuzzy set approach and Alkire and Foster approach. It consists of distributing individuals along a continuum of well-being (between 0 -a maximum well-being, and no deprivation- and 1 -a minimum welfare marked by absolute deprivation). The counting method of this measure goes through four stages, namely: 1) determining the weight of defining the dimensions of well-being of children; 2) standardization of variables defining the well-being of children; 3) calculation of the composite of deprivation index 4) calculation of the indices of multidimensional poverty according Alkire and Foster approach.

#### **Step 1:Weighting Scheme**

Determining the weight of dimension is the main concern of the multidimensional poverty measurement. The choice of an appropriate weight is one of the fundamental steps in the calculation of poverty composite indices of. As part of this work, we use the method proposed by Cerioli and Zani, which evolves around the following relationship:

$$w_j = \ln \left[ \frac{\sum_{i=1}^n n_i}{\sum_{i=1}^n x_{ij} n_i} \right] \quad (1) \quad \text{avec} \quad \sum_{i=1}^n x_{ij} n_i > 0$$

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<sup>2</sup> The notion of the Child adopted by the present work is consistent with that of United Nations agencies and especially UNICEF. Thus we consider child any person whose age is strictly less than 18 years.

$x_{ij}$  represents the score of the  $i$ -th individual in relation to the  $j$ -th dimension, and  $n_i$  is the weight of an individual or group of individuals. This means that the weighting of each dimension is weighted by the logarithm of the inverse of the frequency of non-full or partial fulfillment of this dimension (the dimension of deprivation score).

### **Step 2: Standardization of measurement variables: Determination of the the score function.**

This function is defined as follows:

$$\varphi_{ij} = \begin{cases} 1 & \text{si } \varphi_{ij} = \varphi_j^{\min} \\ \frac{\varphi_j^{\max} - \varphi_{ij}}{\varphi_j^{\max} - \varphi_j^{\min}} & \text{si } \varphi_j^{\min} \leq \varphi_{ij} \leq \varphi_j^{\max} \\ 0 & \text{si } \varphi_{ij} = \varphi_j^{\max} \end{cases} \quad (2)$$

with  $\varphi_{ij}$  the score of the  $i$ -th individual in relation to the variable  $j$ -th;  $\varphi_j^{\min}$  and  $\varphi_j^{\max}$  are the minimum and maximum values. Each score is associated with a value between 0 and 1, representing this variable in a given individual or household, the degree of deprivation.

For each dimension with more than one variable, a weighted score is calculated as follows:

$$S_{ij} = \sum_{p=1}^{n_k} r_p \varphi_{ip} \quad (3)$$

With  $n_k$  number of variable dimension  $j$ ,  $r_p$  is the relative weight assigned to the variable  $p$  with  $r_p \geq 0$  and  $\sum_{p=1}^{n_k} r_p = 1$ , and  $\varphi_{ip}$  is the membership function of household  $i$  for the variable  $p$ .

The  $r_p$  weight is obtained from equation (1) by replacing  $j$  with  $p$ .

### **Step 3: Calculate the composite deprivation index (CDI)**

After calculating the weight assigned to each attribute (variable) or dimension, the last step is the determination of composite indices (fuzzy) deprivation. To do this, we must first calculate the deprivation composite index of each individual or household  $a_i$  through the following relationship:

$$\mu_B(a_i) = \frac{\sum_{j=1}^m x_{ij} w_j}{\sum_{j=1}^m w_j}, \quad 0 \leq \mu_B(a_i) \leq 1 \quad (5)$$

Blur poverty index of the subset  $P$  is determined from the relationship:

$$\mu_B = \frac{\sum_{i=1}^n \mu_B(a_i) n_i}{\sum_{i=1}^n n_i} \quad (6)$$

The multidimensional index for each dimension or variable is determined as follows:

$$\mu_B(X_j) = \frac{\sum_{i=1}^n x_{ij} n_i}{\sum_{i=1}^n n_i} \quad (7)$$

### **Step 4: Indices of multidimensional poverty according to the Alkire and Fooster method**

By construction, ICP summarizes all the hardships experienced by children. By classifying them according to the degree of deprivation, this index allows to assess all the indices of multidimensional poverty, including the indices which are the most recognized by Alkire-Fooster, namely:

- Headcount ratio of Multidimensional poverty (H): it gives the proportion of poor children, that is to say, children who accumulate a number of deprivations greater to the poverty line -at least 30% of dimensions deprivation of well-being-;
- The deprivation intensity (A): This index provides information on the gaps faced by poor children in a simultaneous manner. It has the merit to account for the deprivation acuity in children in multidimensional poverty situation;
- The Multidimensional Poverty Index (MPI) : It's a generalization of the intensity of deprivation among all children, whether in poverty or not;
- The index of severity: it gives the proportion of children in situations of deprivation which at least 50% of the spatial dimensions of well-being of the child. It provides information on the share of the poorest children;
- The index of vulnerability to poverty: it gives the share of children whose level of deprivation oscillates in a range between 20% and 30% of well-being dimensions. It provides information on the non-poor children's risk of falling into poverty.

Throughout this work, we will calculate, analyze and compare over time all of these indices (CDI, H, A and MPI).

**The key results from this study are available in:**

### **1- Composite index of children's social well-being**

Between 2001 and 2014, the situation of children in Morocco has experienced a significant improvement in all areas. It is characterized by a tendency to generalize the education of young children aged 6-11 years in primary school, by improving net enrollment rates in other levels: preschool, secondary college and qualifying secondary by a narrowing of the urban / rural and boy / girl disparities in children's access to education, by improving their health and nutrition, and housing conditions which are more decent offering more comfort and security, etc.

This development has resulted in an overall improvement of the children's socioeconomic welfare. The analysis of the deprivation composite index highlights the continuing decline in the situation of children deprivation in all ages, over time. Thus, this index decreased by almost half, from 0.295 in 2001 to 0.128 in 2014, an average annual decrease of about 7.0% during this period. This improvement has concerned the two residence areas : between those dates, the average level of deprivation decreased from 0.115 to 0.052 in urban areas and 0.47 to 0.221 in rural areas.

The spatial distance (urban / rural) of the average level of deprivation shows that deprivation remains a rural phenomenon.

### **2- Multidimensional Indices of Poverty**

With emphasis on the fringe of children subject to deprivation in at least 30% of the size of the welfare area, it appears that the multidimensional child poverty recorded strong downward trend. The prevalence of poor children increased from 43.6% in 2001 to 24.1% in 2007 and 11.0% in 2014. With these rates, the number of children in poverty decreased from 4.9 million children in 2001 to 1.24 million children in 2014, an average annual reduction of 10.0% of the total number of poor children.

By controlling the area of residence, the prevalence of multidimensional poverty decreased from 11.8% in 2001 to 6.1% in 2007 and 2.4% in 2014 in urban areas. These indices are respectively 74.6%, 46.9% and 22.0% in rural areas. It shows that child poverty remains predominantly a rural phenomenon. The difference between these two indices reflects the high concentration of child poverty in rural areas.

With regard to children vulnerability to impoverishment, the risk of falling into poverty reached 23.4% in the countryside, against 5.6% in the urban areas. However, it is clear that if the risk of being vulnerable to multidimensional poverty declined in urban areas, 7.2% in 2001 versus 5.6% in 2014, it has, however, increased in rural areas from 12.5% to 23.4% between 2001 and 2014.

The rate of children escape from poverty is at different speeds across regions of the country. Between 2001 and 2014, the largest decline was recorded in the regions where the phenomenon is more widespread: it fell from 59.8% to 16.5% in "Marrakech-Safi", 46.4% to 10.0% in "Tanger-Tetouan-Al Hoceima", from 44.6% to 14.6% in "Béni Mellal-Khénifra".

The examination of the correlates between the conditions of children and the conditions of their family homes shows that multidimensional poverty affects more 5 to 6 years old children, a poverty rate of 21.0%, while the 7-14 years old children are the least affected by this form of poverty (7.3%). Despite the narrowness of the poverty rate of 7 to 14 years old, the poor children within this age group contribute about 28.3% of the total child poverty.

Another approach to the issue of children in poverty is to focus on the demographic and economic conditions of their households. Poverty experienced in childhood is a social reproduction of adult poverty and a consequence of poor living conditions.

Thus the number of children in the household notoriously makes a difference on the children well-being. In 2014, the poverty rate has more than quadrupling depending on whether the household has one child (6.5%) or 6 children and more (28.0%).

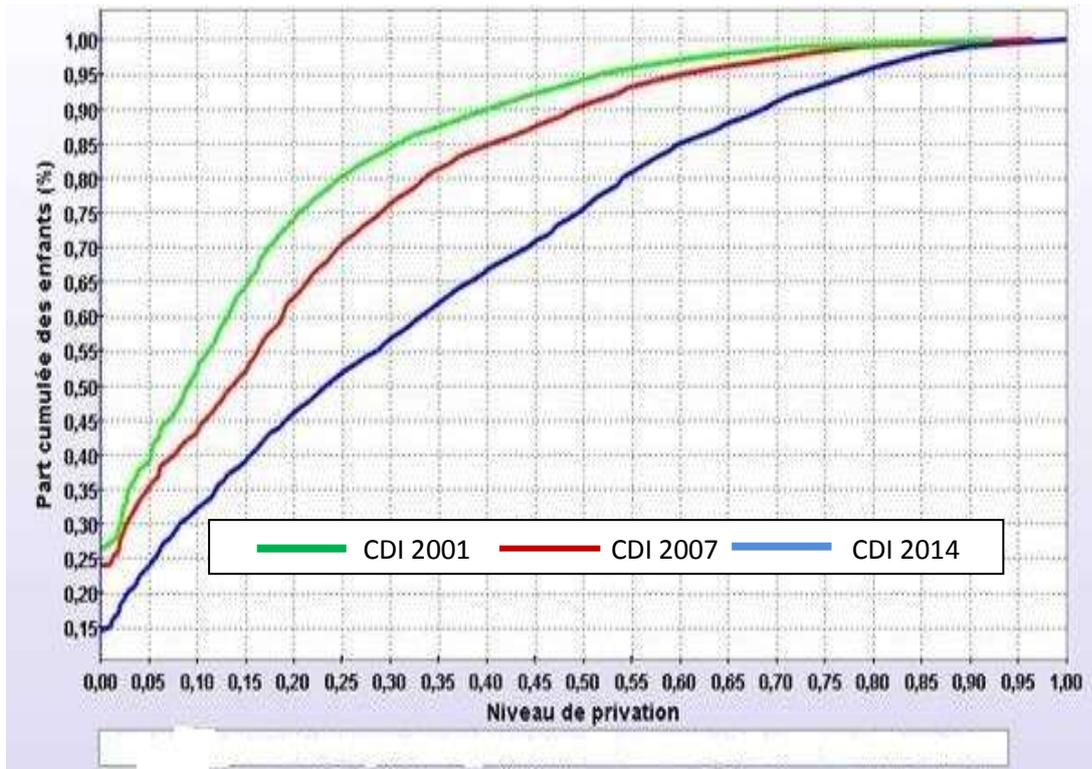
### **Intergenerational transmission of poverty: the socio-economic situation of the household and especially parents have a strong impact the child's destiny.**

The head of household sex differently impacts the situation of children with regard to poverty. In 2014, the poverty rate is 11.2% among children whose head of household is a man, against 8.6% in Guiders' children. Children headed by women have a 3.1% chance to be among children little or no at all deprived than their counterparts living in households headed by a man.

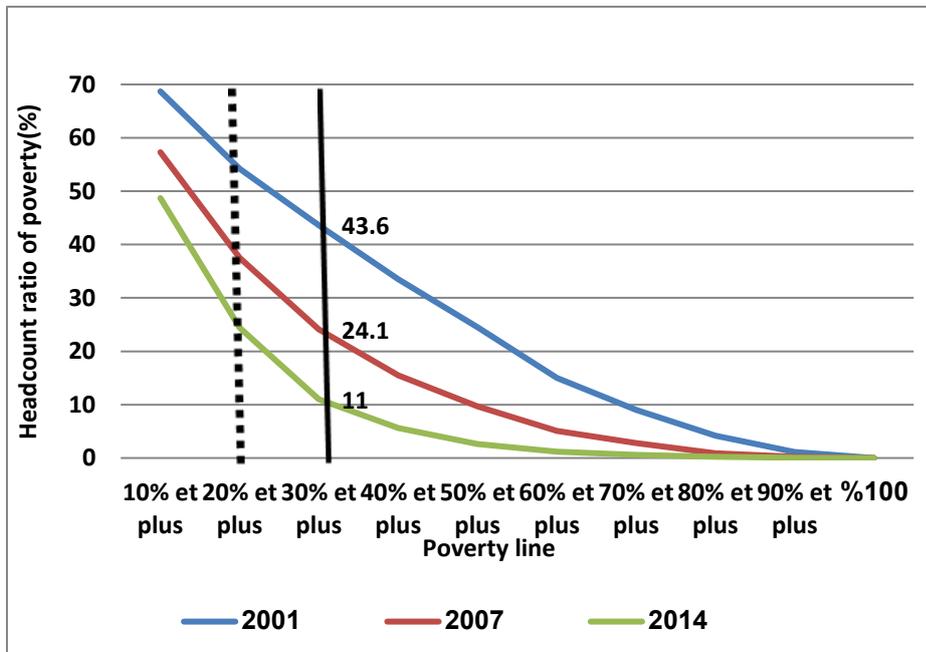
Education and knowledge are also proving essential determinants in improving children's living standard. The level of household head education has a central role in determining the level of child poverty: the incidence of child poverty is 0.5% for children of households headed by a leader with a higher education, against 16.4% of households headed by children without school level.

The risk of multidimensional child poverty is strongly differentiated by the head of household's socio-professional category of. In 2014, the incidence of child poverty is more marked among children in households headed by "farmers", a 25.4% poverty rate, "farm workers and laborers and fishing" (24.3%), "small trades" (11.3%) and "craftsmen and skilled workers" (8.9%). The risk for a child to fall in poverty or vulnerable to poverty is 19.1% higher in children "farm workers and laborers" than in children "managers and senior managers".

Graph 1: Distribution curve of CDI



Graph 2 : Multidimensional poverty incidence curves



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